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The Agricultural College

EXTENSION BULLETIN

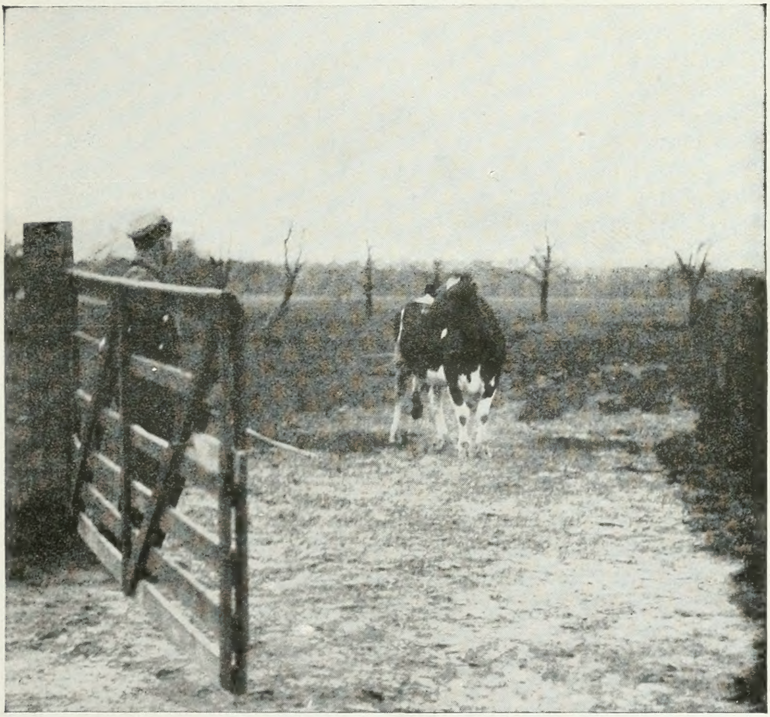
Vol. VII. MARCH, 1912. No. 7

THE CARE OF MILK

By A. B. GRAHAM, Superintendent of Agricultural Extension.

THE HOUSE FLY AND THE BLOW FLY

By JAMES S. HINE, Professor of Zoology and Entomology.



"Then come along home, pretty mooly cow, do,"
The mooly cow only said, "Moo-o-o!"

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THE COW-BOY'S SONG.

* * *

"Mooly cow, mooly cow, home from the wood
They sent me to fetch you as fast as I could.
The sun has gone down; it is time to go home.
Mooly cow, mooly cow, why don't you come?
Your udders are full, and the milkmaid is there,
And the children all waiting their supper to share.
I have let the long bars down,—why don't you pass through?"
The mooly cow only sad, "Moo-o-o!"

"Mooly cow, mooly cow, have you not been
Regaling all day where the pastures are green?
No doubt it was pleasant, dear mooly, to see
The clear running brook and the wide-spreading tree,
The clover to crop, and the streamlet to wade,
To drink the cool water and lie in the shade;
But now it is night; they are waiting for you."
The mooly cow only said, "Moo-o-o!"

"Mooly cow, mooly cow, where do you go,
When all the green pastures are covered with snow?
You go to the barn, and we feed you with hay,
And the maid goes to milk you there, every day;
She pats you, she loves you, she strokes your sleek hide,
She speaks to you kindly, and sits by your side;
Then come along home, pretty mooly cow, do."
The mooly cow only said, "Moo-o-o!"

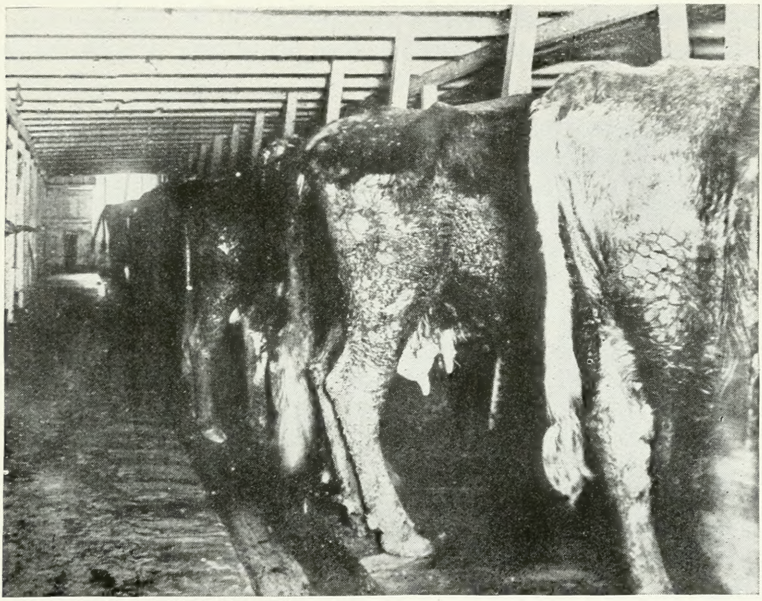
"Mooly cow, mooly cow, whisking your tail,
The milkmaid is waiting, I say, with her pail;
She tucks up her petticoat, tidy and neat,
And places the three-legged stool for her seat:—
What can you be staring at, mooly? You know
That we ought to have gone home an hour ago.
How dark it is growing! O, what shall I do?"
The mooly cow only said, "Moo-o-o!"

—*Mrs. Anna M. Wells*

THE CARE OF MILK AND THE MAKING OF BUTTER

By A. B. Graham.

Eggs can be kept for many days, meat can be preserved for months, vegetables and fruits can be safely placed in cold storage or in a cellar for a long time, or preserved in cans indefinitely; of all the farm products, milk requires the most care to prevent deterioration. Eggs should be kept where the least amount of air can penetrate them; meat must be covered with brine or smoke to prevent the entrance of bacteria that cause decay or must be kept under such a cold temperature that these bacteria cannot live; vegetables must be kept in cold places for like reasons; fruit should be carefully handled so that the skins may not be broken and bacteria enter the pulp; a cool place in an earth mound, cellar, or a cold storage room should be provided to prevent the multiplying of harmful bacteria. Since milk is a liquid into which dirt may fall and carry not only filth but bacteria that will cause it to sour quickly, great care should be taken to prevent

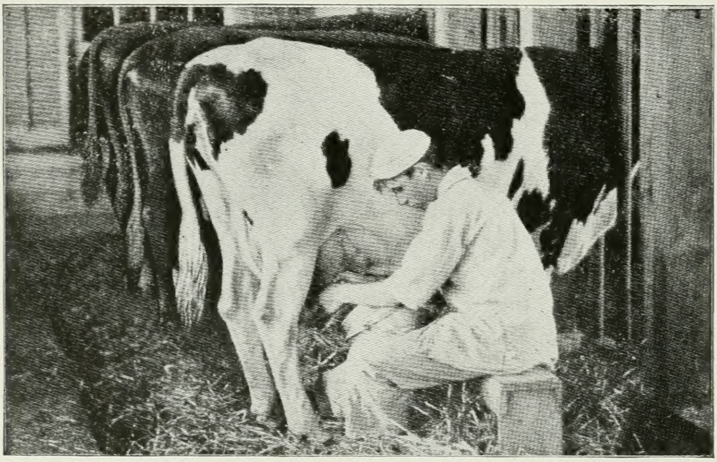


Filthy condition of cattle due in part to insufficient bedding. This condition is one source of filth in milk.

Since the law requires that Agriculture be taught in the common schools, it has been thought best to republish some of the extension Bulletins which will be most helpful in conducting the work.
A. B. GRAHAM.
Superintendent of Agricultural Extension.

the entrance of anything that will cause it soon to lose its good qualities. Dirt will dissolve in milk just as salt or sugar will dissolve in water.

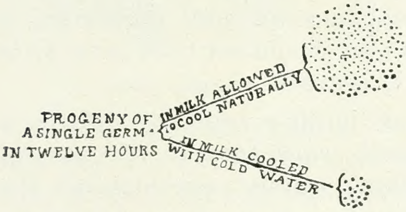
In the first place, extreme care should be taken that there be as little dirt as possible on the body of the cow and the udder. In some of the large dairies each cow is given a bath before she is milked; this may not be practical in all cases but, since the small dust particles from the cow carry both filth and bacteria, the necessity for bedding dairy cows well and rubbing off the dust prior to milking should be emphasized. No pains should be spared to clean the teats and udder with a damp cloth. The practice of some milkers, that of sticking their fingers into the milk to dampen the teats, is to be condemned. The milker's hands should be washed before he begins to milk and loose dirt, hairs, etc., should be brushed from his clothing. When milking is done near the roadside, from which a cloud of dust may be sent by a gust of wind into the milk and onto the milker, both bacteria and dirt are added to the milk. Dust that flies into the air during the throwing down of hay, straw, etc., from the mow will contribute its share in causing the milk to lose its good qualities. Festoons of cobwebs and dust covered joists add to the dirt sources already named.



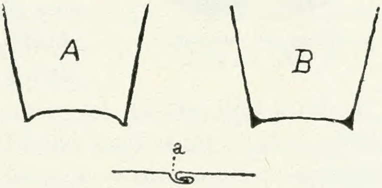
Clean cows, plenty of bedding, a clean milker, and a protecting top to bucket. Present conditions are favorable to the production of clean milk.

Persons who use an open pail expect to remove all dirt by straining the milk through a fine wire screen or through a few thicknesses of thin goods. Since the most harmful dirt that enters milk soon dissolves, to remove it by straining is quite as impossible as to strain the salt from water in which it has been dissolved. After reasonable care has been taken to make the cow clean, and the milker and place of milking have received attention, the partially covered milk pail should be used. Some dairymen use a milk pail having a fine wire screen which fits into the top, and just before milking place on the screen a layer of surgeon's cotton. This layer of cotton prevents air circulation and the entrance of small particles of dust and dirt.

The introduction of bacteria into milk or cream may bring about a desirable or an undesirable result, depending upon the kind of bacteria allowed or encouraged to grow. Apples rot because undesirable bacteria enter through the broken skin; meat spoils from their attack; and milk sours from the increase of bacteria that are so easily introduced in the dirt that falls from the warm air circulating over the pail. Neither harmful nor helpful bacteria can multiply rapidly unless temperature conditions are proper. Sufficient heat will destroy them or cold will check their multiplication. Milk that is kept under a low temperature, say 40° Fahrenheit, will not sour quickly because bacterial growth is prevented. The temperature of ordinary well or spring water is about 55° Fahrenheit. Milk set in a tightly closed trough through which there is running water or a frequent change of well water, can be kept sweet for many hours, provided proper care has been taken in the milking. Buckets, strainers, pans, or any other utensils with which milk comes in contact should be kept clean. In cleaning the utensils, cold water should first be used to rinse out all milk, then hot water should be used. If hot water is used first, it coagulates the albumen in the milk and the resulting particles cannot be easily removed from the corners. All metal utensils used for milk should be well soldered so that nothing will remain in the seams at the bottom or up the sides; the joints also should be well filled with solder.


PROGENY OF A SINGLE GERM IN TWELVE HOURS
IN MILK ALLOWED TO COOL NATURALLY
IN MILK COOLED WITH COLD WATER

A diagram showing how temperature affects the growth of bacteria in milk.

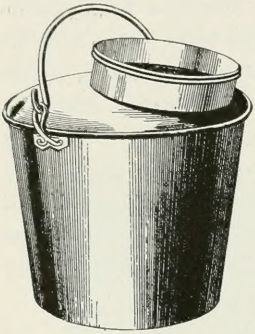


A diagram showing good and bad joints in milk pails.

One plan for keeping milk sweet is to pasteurize it; that is, to heat it slowly to about 160° Fahrenheit and hold it at that heat for a few minutes until bacteria are killed; the temperature of the milk is then reduced to between fifty and sixty degrees to prevent the growth of any bacteria that may enter it from the air. Heating milk beyond

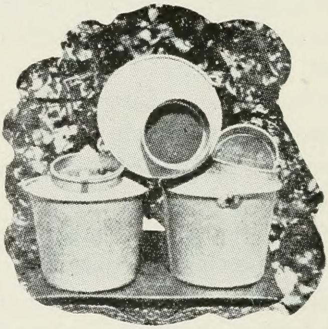
160° gives it a burnt taste and an odor due to the solidifying or cooking of the albumen and the burning or carmalizing of the milk sugar. This albumen may be seen in the light scum which forms on milk that has been subjected to heat. If the scum be brownish, it is due to the carmalized milk sugar.

Milk should never be placed in a musty cupboard or near cooked turnips, onions, or other foods giving off odors. Being a liquid, it absorbs odors very rapidly. For the same reason, it should not be placed in a cellar or other place where there are decaying vegetables. Rag weeds and other plants having peculiar odors when eaten by a cow will often render the milk unpalatable. Butter, also, will taste of the plant eaten by the cow. Some claim that these odors may be imparted to milk from pollen that falls from the cow feeding upon plants having some peculiar odor. Most odors can be driven from the milk by heating it slowly. The heat should not be so great as to form a scum of albumen.



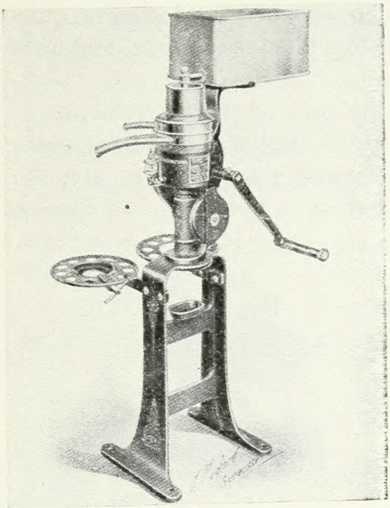
Type of sanitary milk buckets.

Milk will become ropy, due largely to dirty vessels, or take on a color, usually pink, from harmful bacteria which enter it. The natural color of milk is white or a light yellow; neither color indicates the richness of the milk; that is indicated by the butter fat content. The color may satisfy the eye but nothing other than the Babcock Milk Tester will determine the per cent of butter fat.

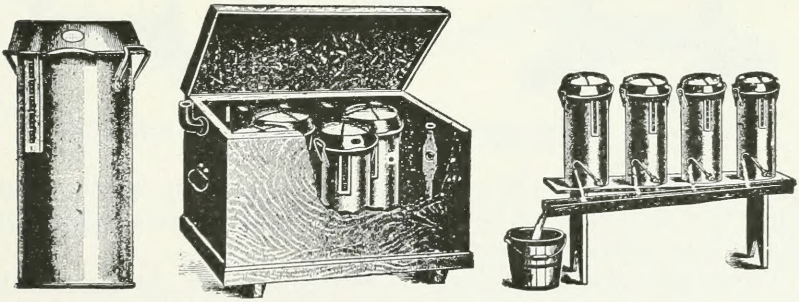


Types of sanitary milk buckets.

The cream may be separated from the warm milk by the use of the cream separator. The great advantages in the use of such a machine are that one is able to feed the warm skimmed milk immediately and to secure practically all of the cream for butter. The most common method of securing the cream is to allow the globules of fat to rise to the surface of the milk and then skim them off. By this method much of the cream is stirred up and again mixed with the milk. If the milk is fed there is not such a great loss, but there need be no loss if a better method of cream gathering be practiced. Creaming by setting deep and narrow cans in cold water is one of the best methods. The milk is usually withdrawn from a small faucet in the bottom of the can; by removing the milk in this way, the cream is not mixed with it again. After removing all the mlik, the cream may be drawn off. This process is known as deep setting. Another method, but one not to be recommended, is water dilution. The adding of water to cause the cream to rise lessens the feeding value of the skimmed milk; it also adds to the distance through which the small fat globules must pass in rising to the surface.

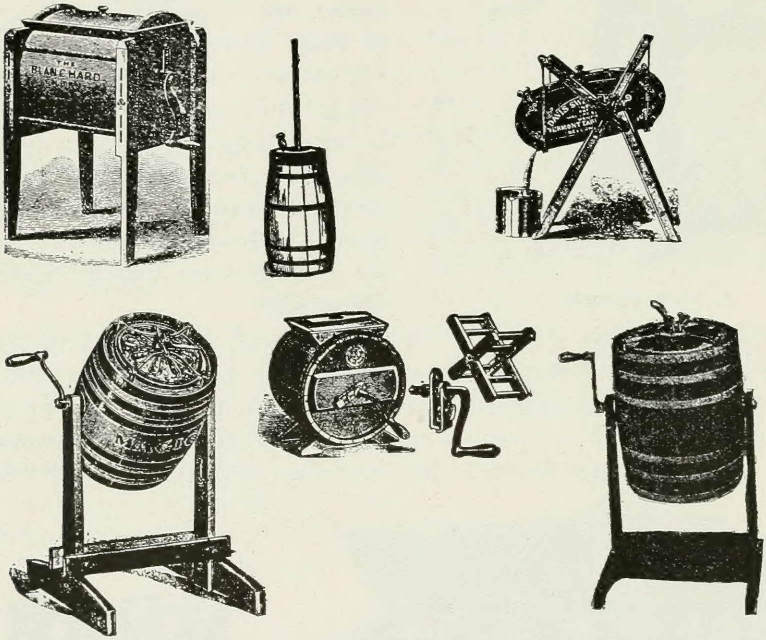

A cream separator.

In the making of butter, the cream must be allowed to ripen. Here desirable bacteria do their work. Cream may be attacked by still other kinds of bacteria and undesirable conditions and flavors brought about. The kinds of bacteria that multiply under certain temperature conditions determine the characteristics of the cream or butter.


Creaming by deep setting.

In ripening the cream to give the butter the most acceptable flavor, it is necessary to introduce the desirable bacteria before the undesirable get a hold. In commercial butter making, a "starter" containing the desirable bacteria is put into the cream. In farm butter making, a little buttermilk, kept for the purpose, can be used as a "starter," but it is best to have clean cream from clean milk kept at the proper temperature for ripening. Cream is sometimes kept until a large quantity accumulates. A butter of much better quality can be made if the cream is not allowed to age too long and thus acquire undesirable qualities. Butter made from old cream has a musty or moldy odor.

Cream should be kept cool up to the time of the introduction of the "starter" or until the ripening process begins. As the ripening begins the temperature should be between 65° and 70° to give the best conditions for a rapid growth of desirable bacteria. As soon as the cream acquires a mild sour taste and a granular condition, the temperature should be lowered to prevent further fermentation. The cream is then ready for churning.

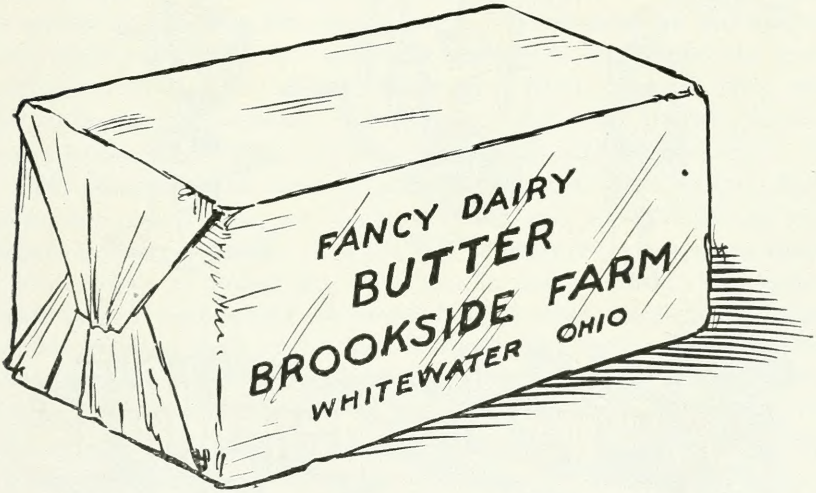


Common types of churns. The two lower ones are preferred.

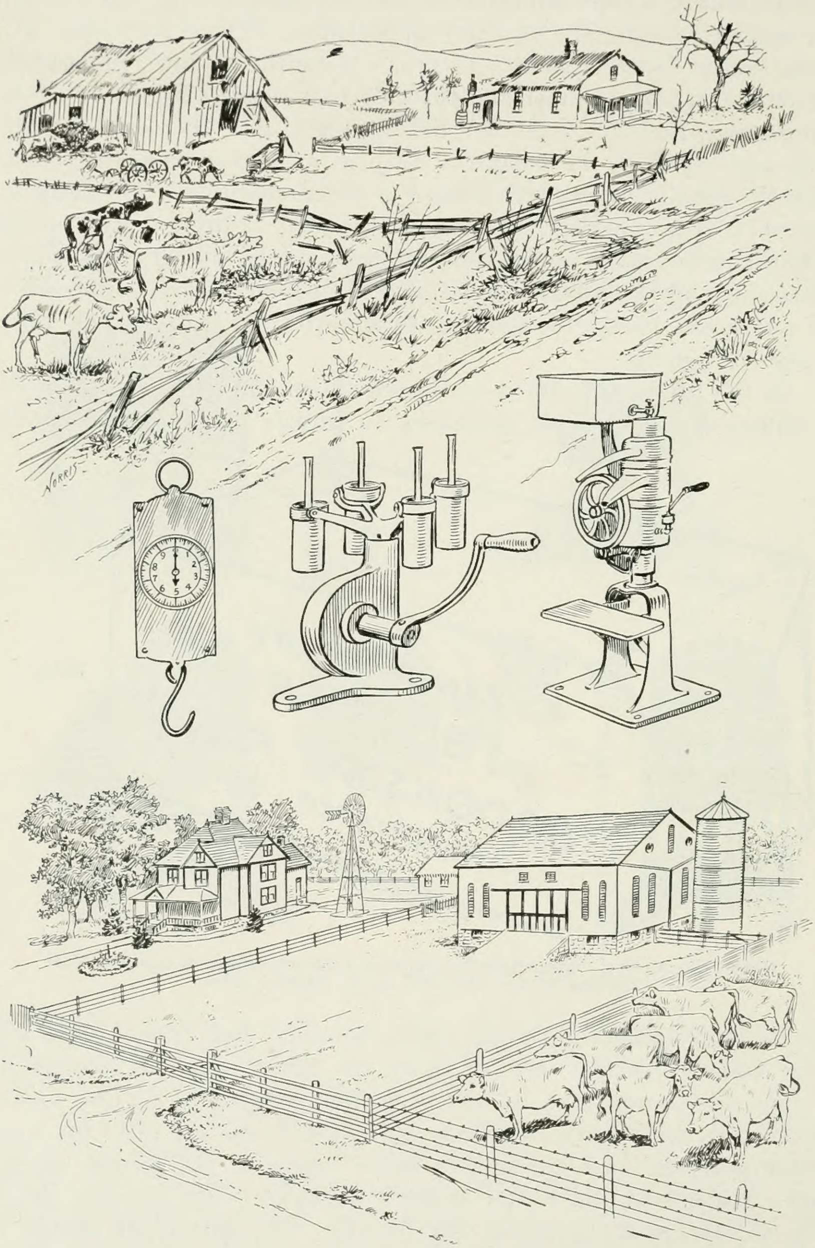
Churning is simply a process of beating together the fat globules into grainy masses. One of the best churns is the common wooden or earthen barrel churn. Dashers or any other sort of agitating or beating arrangement need not be used to insure the best results. The cream should not occupy over one-half of the churn capacity. There should be ample room for the cream to be thrown from one end of the churn to the other as it is turned over and over.

Churning should be done at as low temperature as is reasonable. If it is done at a high temperature, the fat globules run together and the butter has an oily or salvy appearance. There will also be a great loss of butter globules in the buttermilk. A low temperature, say 50° to 54° for summer and three or four degrees higher in winter for factories and 55° to 60° for the farm, will give the most desirable body and result in the complete removal of butter from the buttermilk. It usually takes much longer to churn cream at a low temperature than at a high one. Any churn claimed to bring butter in one or two minutes is not worth consideration; nor is one which is said to churn a pound of butter from a quart of ordinary cream. The use of hot water may hasten the coming of the butter but it causes the butter to lose its quality.

In the use of the old up-and-down churn and other dasher styles of churn, it was thought necessary to gather the butter by slowly working the dasher until the butter granules had been beaten into large masses. In this style of churn the butter must be "gathered" to that degree that the dasher is entirely supported by the butter. In this process of gathering there is too much beating, after the small butter granules have formed, to make butter of the proper consistency. Instead of the butter being "gathered," the process should stop as soon as the granules are formed. The buttermilk should be drawn off and enough pure water of the same temperature poured upon the butter to wash the buttermilk out thoroughly. The butter should then be salted and well worked to remove the remaining but-



Butter put up in a neat, attractive package catches the eye of the discriminating buyer, and sells at the highest price.



A study in comparisons. Peter Tumbledown says dairy farming does not pay; Farmer Thrift, who uses the scales, Babcock tester and cream separator, proves that it does.

termilk. The working should not be carried so far that the butter loses its texture.

Other things being equal, the person who makes butter into pound packages will receive a better price for it, for the merchant can handle it at no loss from chipping which results in cutting a pound or two pounds from a large roll.

Cleanliness and proper temperature are essential conditions for good milk and for the making of good butter.

THE HOUSE-FLY AND THE BLOW-FLY.

James S. Hine

There are a number of different species of flies that enter houses. Some of these species are so much alike in appearance that most people cannot tell them apart, while others differ so much in size and in many other ways that only a glance is required to distinguish one from another. Two common species which are entirely distinct from one another in size, appearance, and breeding habits are the two species named in the title of this article—the house-fly and the blow-fly.

The females of the house-fly pass the winter in attics, cellars, dark rooms, and various more or less protected places about buildings and perhaps in other locations. It is not rare to observe them buzzing about in warm rooms at almost any time, even in cold weather. The winter season is a critical period for house-flies for their numbers are much reduced. Only a small percentage of the females survive even the first cold weather, and many of those that are left meet death in one way or another. When spring comes only a comparatively small number remain to furnish the source for several generations of flies the following summer. This fact explains why house-flies are rather scarce for a time in the spring.

It is always noticeable that as fall approaches flies become more and more numerous. This condition is easy to understand when the very short life history and their reproductive powers are understood. The females that have passed the winter are ready to lay their eggs as soon in the spring as conditions are suitable. The average number of eggs laid by a single female is stated to be about 120. In warm summer weather eggs hatch in eight hours and the larvae grow to full size in five days. Five more days are required before the adult issues from the pupa. Therefore, under the most favorable conditions of temperature, only ten days are required to carry the insect from the egg to the adult. We now have sufficient evidence to account for from twelve to fourteen generations of the house-fly during a season that is favorable to reproduction.

The house-fly has long been known as a distinct pest about the house, but not until within the last few years has it become known as a prominent enemy of mankind on account of its being associated with the carrying of various infectious diseases, chief among which, in this country, is typhoid fever. Many physicians, as well as careful students of insects, have contributed to the study of this matter and all have arrived at the same conclusion, namely, that flies undoubtedly serve as carriers of the germs of typhoid.

One way of carrying bacteria of tuberculosis to foods.

Dr. Victor M. Vaughan was a member of the typhoid commission appointed to make an investigation of typhoid fever in the concentration camps of the United States Army in the summer of 1898; he is authority for the following statement in regard to the ways by which flies aid in the transmission of typhoid: "It is possible for the fly to carry the typhoid bacillus in two ways. In the first place, human excrement containing the typhoid germ may adhere to the fly and be transported. In the second place, it is possible that the typhoid bacillus may be carried in the digestive organs of the fly and may be deposited with its excrement."

House-flies have been observed to lay their eggs on many substances, among which are horse and cow manure, human excrement, collections of fermenting vegetable refuse, bedding of poultry pens, miscellaneous garbage and the like. The known habits of the flies show that they go from these unclean substances, laden with various germs, to kitchens where they run over the food, dropping the germs promiscuously; then back they go to the places where the eggs are layed, gather an additional supply of germs, and return again to the kitchens. What a preventative is the door or window screen! Dr. Vaughan made the following statement: "Flies swarmed over human excrement in the pits infected with typhoid germs and then visited and fed upon the food prepared for the soldiers at the mess tents. In some instances, where lime had recently been sprinkled over the contents of the pits, flies with their feet whitened with lime were seen walking over the food."

After gathering the facts concerning the movement of flies and their ability to carry germs from the substances in which they breed to food products, where they may be taken into the digestive system of man, Dr. Howard was led to make the following statement in one of his publications: ''Now when we consider the prevalence of typhoid fever and that virulent typhoid bacilli may occur in the excrement of an individual for some time before the disease is recognized in him and that the same virulent germs may be found in the excrement for a long time after the apparent recovery of a patient, the wonder is not that typhoid is so prevalent but that it does not prevail to a much greater extent.''

The birth place of house-flies.

They may fall into milk after having typhoid germs or other bacteria on their feet.

Two investigators, Esten and Mason, at the Storrs Agricultural Experiment Station, Storrs, Connecticut, have issued a bulletin entitled ''Sources of Bacteria in Milk,'' in which a table is introduced showing the number of bacteria of all kinds that may exist on a single fly. Flies were caught under different conditions with a ''germ free'' net, each was placed in a ''germ free'' bottle and a known quantity of ''germ free'' water added. Then by shaking the bottle a condition similar to that of a fly that had fallen into a can of milk was produced. Individual flies to the number of 414 were treated in this way and the results counted, showing a minimum of 550, a maximum of 6,600,000 and an average of nearly one and one-fourth million bacteria. Of course not all of these bacteria were injurious, but in case flies are carrying typhoid germs it is easy to understand how these may get into milk.

From the evidence at hand, we are convinced that the fly is a very important agent in the transfer of bacteria from one place to another and from this standpoint is a menace to public health. Circumstances call for the co-operation of the inhabitants of both country and city in a general warfare against it. Since horse manure in the proper condition with respect to moisture is known to be the natural breeding place of the insect, certain practices directed toward keeping flies away from this material should be adopted. Several cities have adoptel the plan of compelling owners of horses to build tight bins for the reception of stable refuse and requiring the sweeping of stables regularly; noticeable results have been accomplished. On farms in summer this method does not appear to be altogether impractical. It is known that flies do not select dry manure on which to place their eggs; so if the barn and yard are cleaned up systematically once or twice a week and the resultant spread in the fields, much will be accomplished in preventing house flies from multiplying and the manure will be handled in such a way as to give the most satisfactory results as a fertilizer. Approved methods of handling garbage and modern methods of sewage disposal should be adopted. Since the most likely place for flies to pick up typhoid bacilli is about human excrement this substance should not be left in exposed places, and closets should be constructed so as to exclude the flies from the vaults.

The Blow-fly.

The so-called green-bottle, blue-bottle and flesh flies belong to a group that lay their eggs on meat and the larvae feed on this material. They are important natural scavengers for it is surprising how quickly they are able to reduce the carcass of a dead animal that is left in an exposed condition. Some of the species even lay their eggs in wounds or about foul areas of living animals and the larvae hatching in such places frequently cause much annoyance and even injury if they are not promptly detected.

The common blow-fly is a well-known member of this class. The species is very much larger than the house-fly and has a bluish-black thorax and a dark metallic blue abdomen and the sound of its wings about houses in early spring often fills the house-keeper with horror; there is no telling what piece of meat has furnished the fly with a suitable place to lay its eggs, for one kind of meat as well as another, in the fresh condition, is liable to be ''fly-blown.''

The female of this species lays many more eggs than does the house-fly, but more than twice as much time is required to pass the life cycle. Hewitt observed that twenty-two or twenty-three days were required from the laying of the egg to the issuance of the adult, but believes that this time would be shortened under more favorable conditions.

How can one tell what filth the clean appearing house-fly last visited? Perhaps where there are typhoid germs.

The blow-fly visits various kinds of filth and no doubt becomes loaded with various kinds of bacteria at times, but as it is usually found out of doors, only entering dwellings to find suitable places for egg deposition, and as it very rarely appears in large numbers, its ability to transmit disease germs is not to be compared with that of the house-fly.

A typhoid patient who contracted the disease from eating food to which the germs had been carried by house-flies.

ARITHMETIC.

1.—A farmer who has forty acres of land that he wishes to plant to corn finds he must buy his seed. If it takes twelve ears to plant an acre, how much seed corn will he have to buy? What will it cost him at $1.50 per bushel?

2.—Apple trees are usually planted thirty feet apart each way. How many trees can be planted on an acre?

3.—Farmer Jones bought a mow of good timothy hay from his neighbor Smith, paying his $21 for it. The mow measured 20 feet long, 15 feet wide and 10 feet high. How much did Smith receive for his hay?

4.—A buyer contracted for a bunch of hogs at $5.75 per hundredweight. There were twenty-five head in the bunch and when driven on the scales they weighed 5820 lbs. How much did he pay for the bunch and what did each hog bring?

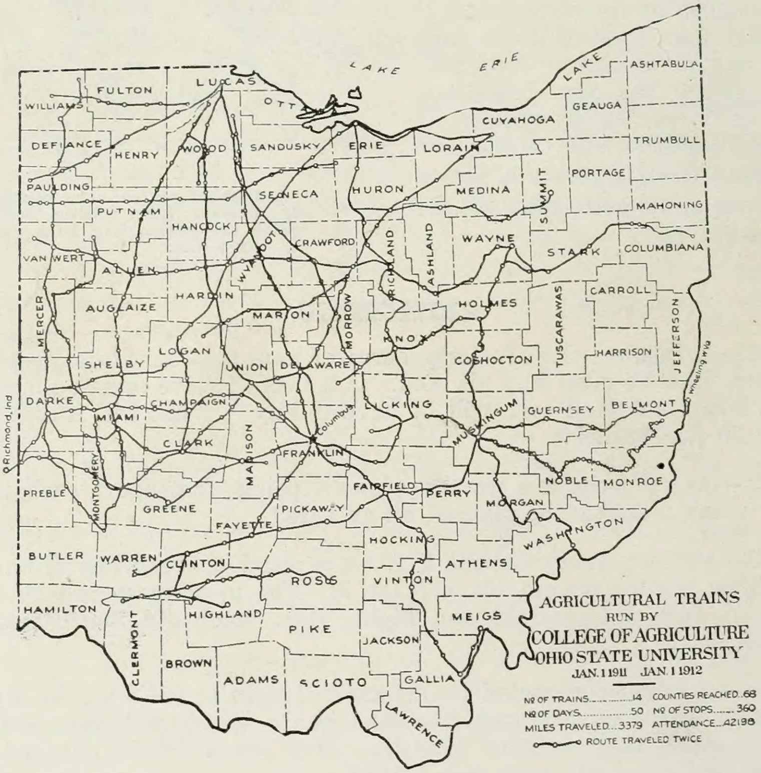
5. A man applied a ton of limestone to the acre and increased his clover crop 1500 lbs. If limestone costs $2.50 a ton and clover hay is worth $15.00 per ton, what was his net profit per acre?

6.—A farmer buys 100 bu. of wheat by measure at 90c per bu. He sells it at 90c per bu. by weight. If the wheat tests 50 lbs. per bu., how much does he gain or lose by the transaction?

7.—A cow produces 12 lbs. of milk per day. The milk tests 4.5 per cent. butterfat. If the man sells the butterfat at 30c per lb., how much does he realize from this source in a year?

8.—If corn, with 15% moisture is worth 70c per bu., how much can a feeder pay for corn with 22% moisture?

9.—A man harvested 3600 lbs. of timothy seed from 12 acres. What was the yield in bushels per acre?



AGRICULTURAL TRAINS
RUN BY
COLLEGE OF AGRICULTURE
OHIO STATE UNIVERSITY
JAN. 1 1911 JAN. 1 1912

Nº OF TRAINS..............14	COUNTIES REACHED..68
Nº OF DAYS..............50	Nº OF STOPS.......360
MILES TRAVELED...3379	ATTENDANCE...42198